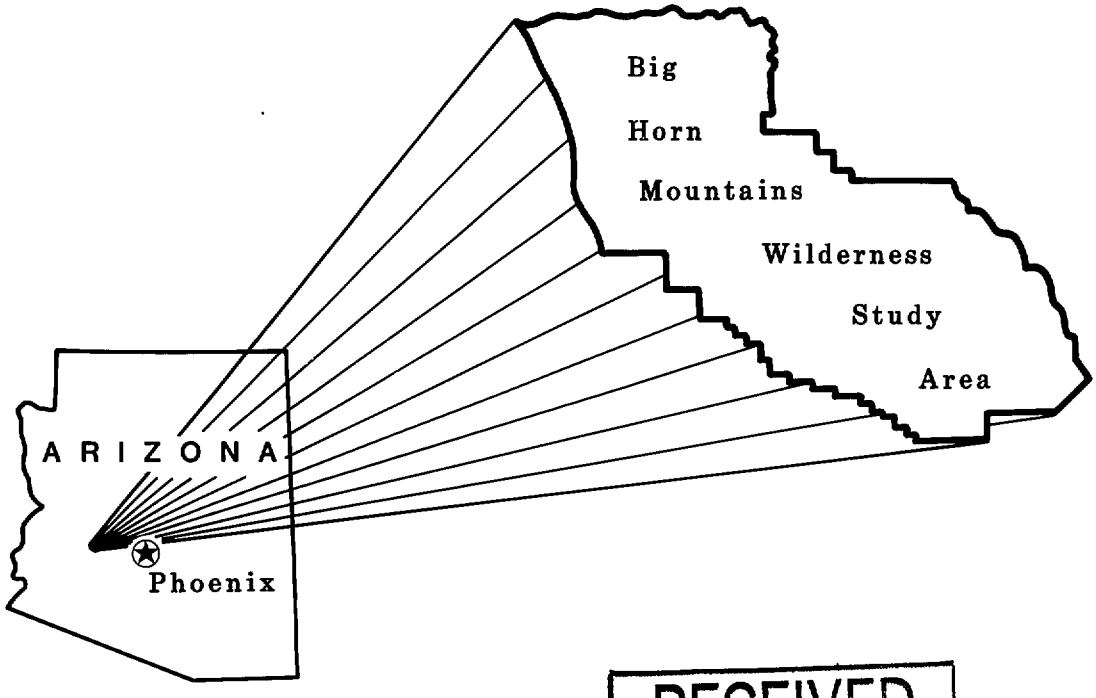
MLA 44-85

Mineral Land Assessment
Open File Report/1985

Mineral Resources of the Big Horn Mountains Wilderness Study Area (AZ-020-099), Maricopa County, Arizona



United States Department of the Interior
Bureau of Mines

MINERAL RESOURCES OF THE BIG HORN MOUNTAINS WILDERNESS STUDY AREA (AZ-020-099), MARICOPA COUNTY, ARIZONA

by

Russell A. Schreiner

MLA 44-85
1985

Intermountain Field Operations Center, Denver, Colorado

UNITED STATES DEPARTMENT OF THE INTERIOR
Donald P. Hodel, Secretary

BUREAU OF MINES
Robert C. Horton

PREFACE

The Federal Land Policy and Management Act (Public Law 94-579, October 21, 1976) requires the U.S. Bureau of Mines and the U.S. Geological Survey to conduct mineral surveys on certain areas to determine the mineral values, if any, that may be present. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a mineral survey of the Big Horn Mountains Wilderness Study Area (AZ-020-099), Maricopa County, Arizona.

This open file report summarizes the results of a Bureau of Mines wilderness study and will be incorporated in a joint report with the Geological Survey. The report is preliminary and has not been edited or reviewed for conformity with the Bureau of Mines editorial standards. Work on this study was conducted by personnel from Intermountain Field Operations Center, Building 20, Denver Federal Center, Denver, CO 80225.

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UNITS OF MEASURE ABBREVIATIONS USED IN THIS REPORT

ft	foot/feet
mi	mile(s)
oz/ton	troy ounces per ton
ppm	parts per million
%	percent

MINERAL INVESTIGATION OF THE BIG HORN MOUNTAINS WILDERNESS STUDY AREA (AZ-020-099), MARICOPA COUNTY, ARIZONA

by

Russell A. Schreiner, Bureau of Mines

SUMMARY

In the spring of 1984, the Bureau of Mines conducted a mineral survey of the Big Horn Mountains Wilderness Study Area, as required by the Federal Land Policy and Management Act (Public Law 94-579, October 21, 1976). The Big Horn Mountains Wilderness Study Area comprises 21,500 acres in northwestern Maricopa County, Arizona. Occurrences of copper, gold, and silver in fissure veins and in pegmatites, iron in placers, and agate as cavity fillings are present in and near the wilderness study area. No resources could be identified within the study area because of the sporadic metal values and the limited extent of the occurrences. No occurrences of oil and gas resources are known to exist in the study area.

INTRODUCTION

In the spring of 1984, the Bureau of Mines, as part of a joint program with the U.S. Geological Survey (USGS), conducted a mineral investigation to evaluate the resources of the Big Horn Mountains Wilderness Study Area (WSA), Maricopa County, Arizona. The Bureau surveys and evaluates mines, prospects, and mineralized areas, and the USGS reports on the regional geology and does reconnaissance geochemical and geophysical surveys in and near the WSA. This report presents the results of work done by the Bureau.

Geographic setting

The Big Horn Mountains WSA, which comprises 21,500 acres of land administered by the Bureau of Land Management (BLM) in northwestern Maricopa

County, Arizona, is located approximately 60 mi west of Phoenix, and 20 mi south of Aguila (fig. 1). The area, situated in the Basin and Range physiographic province, consists of steep, rugged, mountainous terrain and gently sloping, alluvial valleys along the mountain flanks. Elevations range from approximately 1,400 ft on the alluvial plains to 3,480 ft at Big Horn Peak. Access to the WSA from the south is by unpaved roads off Interstate Highway 10 and from the north off U.S. Highway 60.

Method of investigation

Published and unpublished literature relating to the WSA was reviewed to obtain all pertinent information concerning mineral occurrences and mining activity. Mining claim information, land status plats, and oil and gas plats were acquired from the BLM State Office, Phoenix, Arizona.

A field investigation was conducted within and up to 1 mi outside the WSA. Prospects were surveyed by compass and tape method, mapped and sampled. Fifty-four samples were taken, 26 within the WSA. All samples were analyzed by fire assay for gold and silver (table 1). Inductively coupled plasma-atomic emission spectroscopy or atomic absorption spectrophotometry was used to analyze for copper, lead, zinc, iron, and titanium on selected samples (table 1). At least one sample from each prospect site was analyzed for 40 elements by semiquantitative optical emission spectroscopy to determine if any unsuspected elements were present. Detection limits for fire assay, atomic absorption spectrophotometry, inductively coupled plasma-atomic emission spectroscopy, and semiquantitative optical emission spectrography are in Appendix A. All analyses are presented in this report in Table 1 and Appendix B.

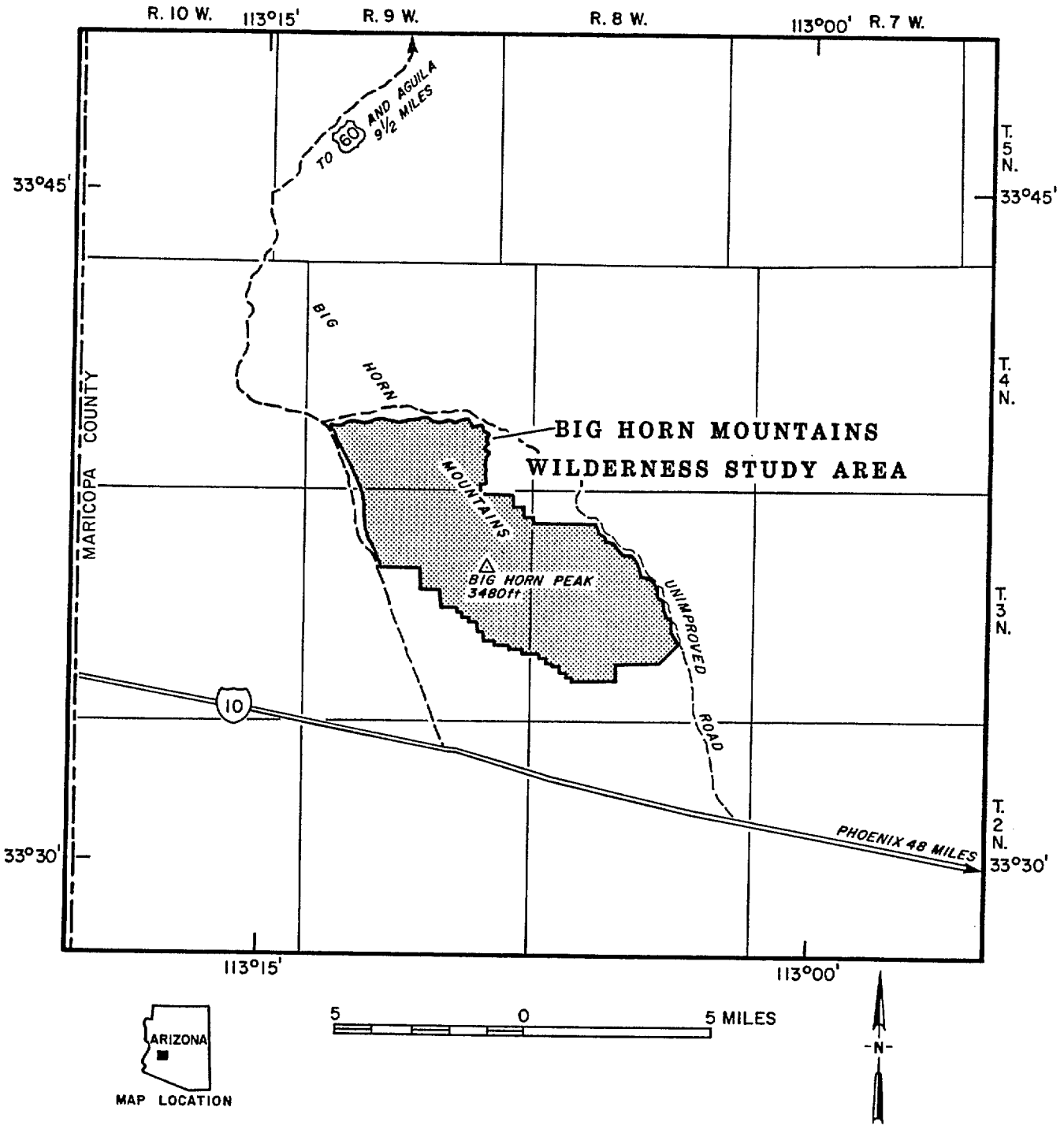

Figure 1.--Index map of the Big Horn Mountains Wilderness Study Area, Arizona.

Geologic setting

The WSA consists predominantly of andesitic tuffs and flows, probably of Cretaceous age, overlying Precambrian metamorphic and plutonic igneous rocks. Metamorphic and igneous rocks are exposed in the northern half of the area where erosion has removed the volcanic rocks (Wilson and others, 1957). Along the northeastern mountain flanks, Precambrian rocks consist of gneiss, amphibolite, and metagranitic rocks, along the northwestern mountain flanks Precambrian rocks consist of porphyritic granites. Quaternary sediments fill the valleys adjoining the Big Horn Mountains.

Mining history

The Big Horn Mountains WSA lies within the Big Horn Mountains mining district. In the studied part of the district only minor activity on occurrences of copper, gold, silver, iron, and agate has occurred since the late 1800's. Mining claims were located on these occurrences in and near the study area as of March 1984 and are shown on Plate 1. Most of the WSA acreage was leased for oil and gas as of March 1984 (fig. 2).

APPRAISAL OF SITES EXAMINED

Prospects on occurrences of copper, gold, and silver in fissures and pegmatites, iron (magnetite) in placers, and agate as cavity fillings are present in and near the Big Horn Mountains WSA.

Copper, gold, and silver prospects

Copper, gold, and silver occur in veins in metamorphic and plutonic igneous rocks. Small sporadic occurrences of secondary copper minerals are present in quartz veins in the metamorphic rocks, silicified pockets along faults, and in pegmatites in the plutonic igneous rocks.

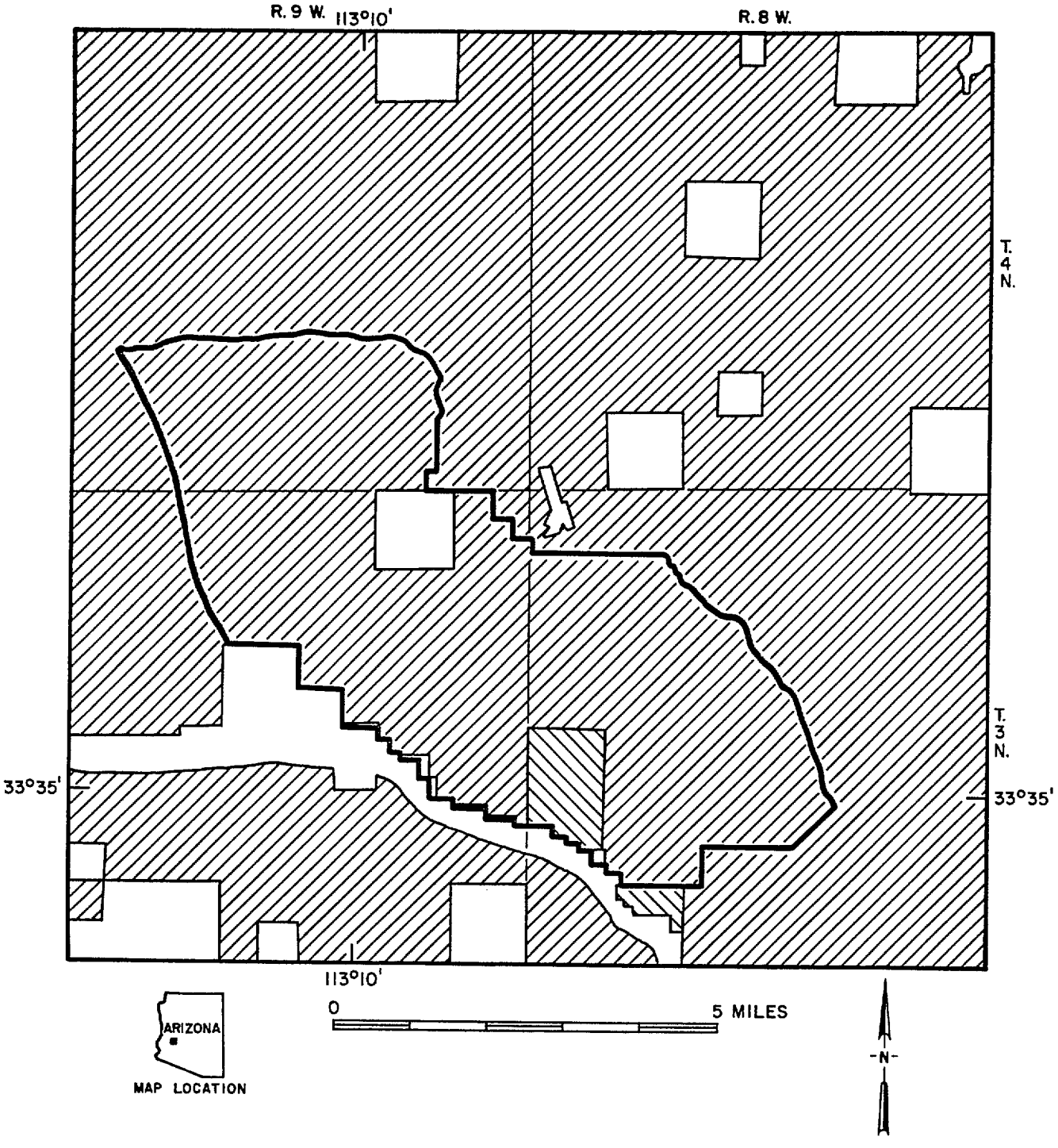

Figure 2.--Map showing oil and gas leases and lease applications in and near the Big Horn Mountains Wilderness Study Area, Arizona.

Prospects in metamorphic rocks

Copper, gold, and silver in quartz veins in metamorphic rocks occur predominantly on and near a group of patented claims (Copper Belt Nos. 1 and 2, Golden State Limited Nos. 1 and 2, and Lead Dome) about 1/4 mi outside of the WSA boundary (pl. 1). On the claims, four shafts and several pits and trenches follow a black, siliceous, north-striking vein containing fine-grained specular hematite, chrysocolla, and malachite. The vein could not be traced outside of the claim block because of alluvial cover. The owners of the patented claims could not be located to obtain permission to map and sample the property.

Other nearby occurrences have been prospected by means of two connecting shafts, pits, and trenches on quartz veins. The veins average 2.5 ft in thickness and consist of quartz and sheared wall rock with spotty hematite staining. Chrysocolla and minor malachite occur as scattered blebs at some prospect sites. The majority of the veins are exposed in small solitary pits and trenches, but in two areas, sample localities 1-4 (fig. 3), and sample localities 10-18 (fig. 4), the veins have been explored for 150-200 ft along strike (approximately N. 75° W.). Only three localities, sample sites 1-4, 5, and 6-7, consisting of a few pits and trenches, are present inside the WSA.

Twenty-four samples (1-21, 24-26) were taken on quartz veins in the metamorphic rocks (7 from prospects inside the WSA). Eighteen of 24 samples did not contain detectable gold; 6 samples (2 within the WSA) contained gold values above detection limits, with values up to 0.32 oz/ton (table 1). Eleven samples (1 within the WSA) contained silver values at or above detection limits, up to 1.6 oz/ton. Copper values above detection limits were present in 11 of 24 samples (1 within the WSA); 9 chip sample values ranged

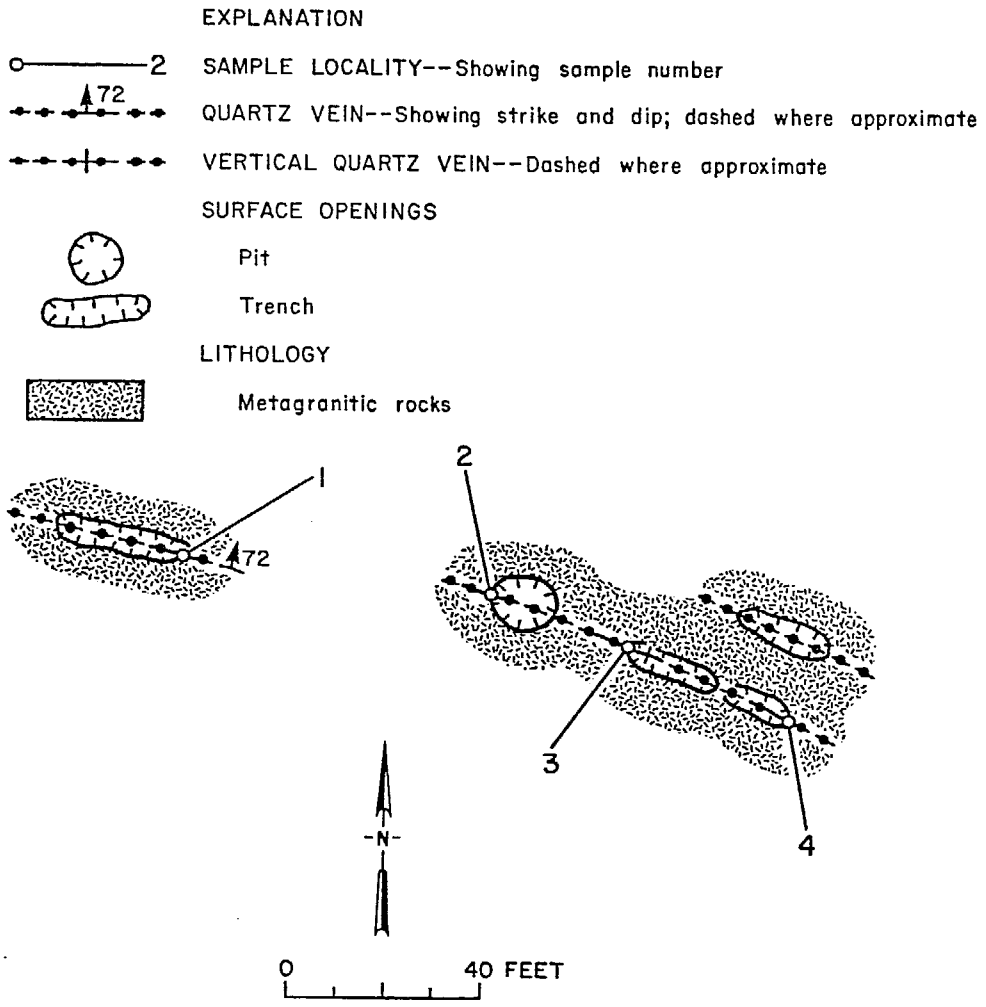

Figure 3.--Surface map showing sample localities 1-4.

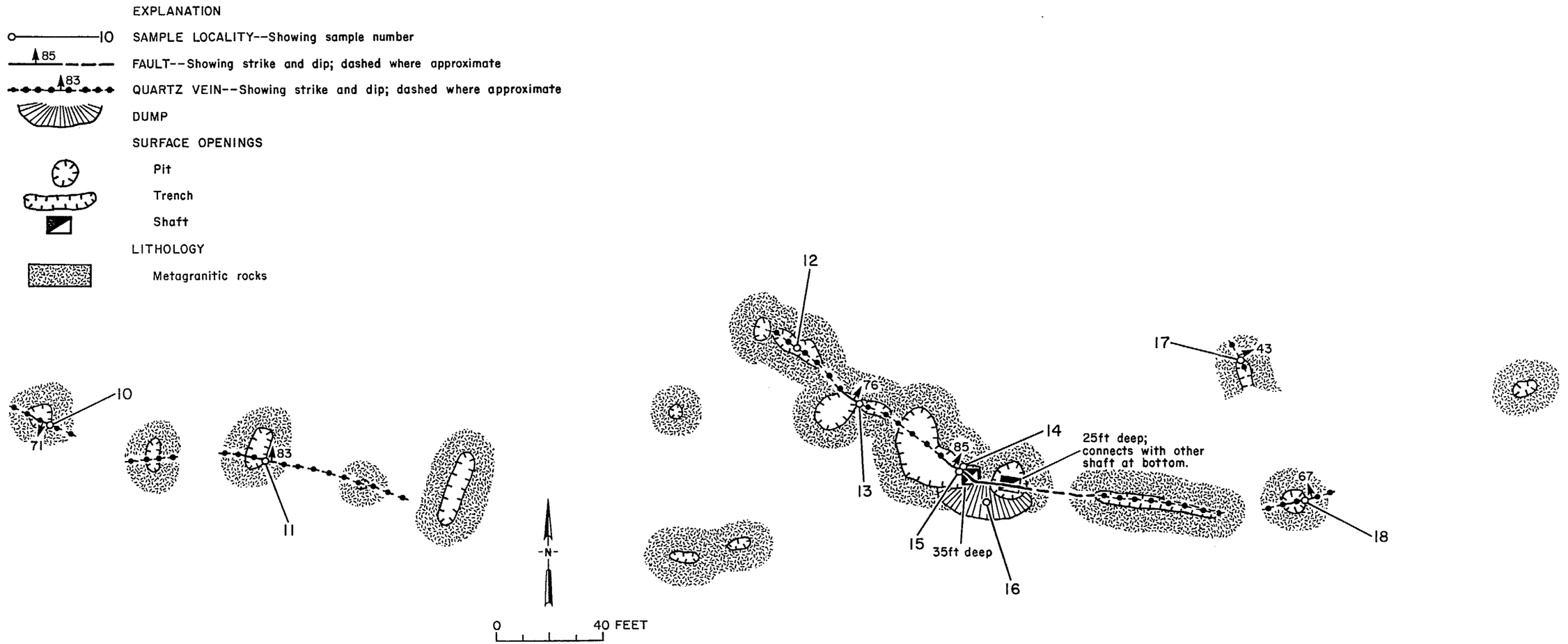

Figure 4.--Surface map showing sample localities 10-18.

from 79 ppm up to 10,000 ppm (1.0%) and two select grab sample values were 2,000 ppm (0.2%) and 46,000 ppm (4.6%). Minor lead and zinc values, 46 to 280 ppm, were present in some samples. A select grab sample contained 3,200 ppm (0.32%) lead and 2,500 ppm (0.25%) zinc. Because of the sporadic metal contents and the limited extent of the occurrences, no resources could be identified within the WSA. Assay results and sample descriptions are given in Table 1.

Prospects in plutonic igneous rocks

Occurrences of copper, gold, and silver in the granitic rocks have been prospected by means of two shafts, 17 and 20 ft deep, and pits, trenches, and bulldozer cuts on faults and pegmatite pods. The Copper Gem, Silverhorn, Scorpion, Sidewinder, Blue and Red Rock claim blocks are located over these areas (pl. 1). A few blebs of chrysocolla and minor malachite and hematite staining occur in small isolated siliceous pockets along the faults (generally thin shears) and in small pegmatite pods. Seven localities, samples 34-35, 36, 43-44, 45-48, 49, 50, and 51-52, including the 17-ft-deep shaft, are present within the WSA.

Twenty samples (27-36, 43-52) were taken from the granitic rocks (13 of these samples were from prospects inside the WSA). Eighteen of 20 samples did not contain detectable gold, but two samples, both outside the WSA, contained 0.01 oz gold/ton. Six samples (one within the WSA), contained silver values above detection limits, with values up to 0.7 oz/ton. Eighteen samples contained copper values above detection limits (11 within the WSA); 13 chip sample values ranged from 51 ppm up to 5,800 ppm (0.58%) and 6 select grab sample values ranged from 13,000 ppm (1.3%) up to 48,000 ppm (4.8%). Because of the limited extent of the occurrences, no resources were identified within the WSA. Assay results and sample descriptions are given in Table 1.

Prospects in alluvium

In addition to the the lode deposits, two areas within 1/2 mi of the WSA contain prospects in the alluvium: sample localities 22 and 23 in a 150 ft trench (Saguaro claims), and sample locality 53, in an 8-ft-deep, partially caved shaft (pl. 1). These areas were prospected probably for placer gold, but no gold was detected in analysis of channel samples. In addition to these areas, a block of claims (Omega, Toni, Nita Wash, Luv, and Alpha claims) are located on alluvium in the eastern part of the WSA (pl. 1), but no evidence of any other activity was found.

Iron prospects

Two thousand six hundred acres of the north and northwestern parts of WSA are covered by part of a 6,000 acre block of placer claims, the Magna and Iron Mac claims, staked for titaniferous magnetite (pl. 1). Titaniferous magnetite sand was reported ranging in thickness from a few feet to more than 100 ft in the alluvium (Harrer, 1964, p. 71). Outside the WSA, several pits and trenches, 1 to 3 ft deep, were found in the alluvium; no concentrations of magnetite were observed at the prospects. Concentrations of magnetite sand were visible as irregular streaks in shallow sand washes in and near the WSA. On the surface, the magnetite sand concentrations range up to 50 ft in length and 15 ft in width. No erosional or man-made cut was present that exposed the subsurface alluvial section in or near the WSA. The wide range of magnetite sand occurrences over the alluvial plain suggests that the source of the magnetite is from weathering of surrounding igneous and metamorphic rocks and not an iron deposit.

Six samples (37-42) of alluvial material were taken along the boundary of the WSA (pl. 1). Each sample consisted of two level 12 in. gold pans of sand

taken from the surface in the magnetite streaks in the washes. Samples contained from 3.9 to 10.1% total soluble iron, from 0.12 to 0.25% titanium, and two samples contained 0.1 and 0.4 oz silver/ton (table 2). The average iron content from the surface samples is 6.6%, predominantly contained in magnetite. This would be equivalent to approximately 9% magnetite; considering that these were high grade samples, the average magnetite content of the sand is probably much lower. This value is not much higher than the average magnetite content of various igneous rocks, approximately 1 to 5% (Dobrin, 1976, p. 492).

Though there is some concentration of magnetite on the surface, extensive mapping and sampling would be required to test the alluvium. Buyers of magnetite concentrates are operators of cement plants or blast furnaces. As of March 1985, these operators were buying 55 to 60% Fe concentrates for about $20/ton. The capital outlay necessary to achieve production and transportation costs to buyers from this location would exceed $20/ton for these low iron concentrations in alluvial deposits. It is unlikely that this deposit would be developed in the near future.

Fire agate prospects

Three sites, two northern prospects (Rainbow and Bighorn claims) inside the WSA and a southwestern prospect just outside the WSA, have been prospected for fire agate (pl. 1). At the two northern prospects, claimants reported that they had removed high quality fire agate, chalcedony containing layers of minute inclusions of goethite or limonite producing an iridescent, fire-like appearance when ground and polished for lapidary purposes. The workings at these three localities consist of small shallow pits and trenches. White to brown chalcedony occurs as cavity fillings in the volcanic rocks. Fire agate

does not appear to be abundant in this area; none was noted on examination of the prospects by Bureau personnel. Other localities may exist where fire agate can be found in the volcanic rocks in the WSA.

Oil and gas

Most of the WSA acreage is leased for oil and gas (fig. 2) but no drilling had occurred as of March, 1984 (Richard Park, BLM, Phoenix District Office, Phoenix, AZ, oral communication, 1984). The Big Horn Mountains consist of metamorphic and igneous rocks. Tertiary sedimentary rocks and Quaternary sediments present inside the WSA in the valleys adjoining the Big Horn Mountains would be the only place where oil and gas could occur. The hydrocarbon potential of the WSA is rated low to zero by Ryder (1983).

CONCLUSIONS

Occurrences of copper, gold, and silver in fissures and pegmatites, iron in placers, and agate as cavity fillings are present in and near the Big Horn Mountains WSA.

Copper, gold, and silver occurrences in fissure vein and pegmatite deposits occur in basement metamorphic and plutonic igneous rocks in the northern half of the WSA. Because of the sporadic metal contents and the limited extent of the occurrences, no resources have been identified.

Iron is present as placer magnetite concentrations in alluvium in the north and northwestern parts of the WSA. Production and transportation costs for this low-grade, alluvial-type deposit in this location would be prohibitive; development is unlikely.

Fire agate may be found in cavity fillings in the volcanic rocks. Prospecting for fire agate would probably be limited to recreational use.

The WSA is underlain predominantly by igneous and metamorphic rocks; no occurrences of oil or gas have been identified. Although most of the WSA acreage is leased, no drilling has occurred. Tertiary sedimentary rocks and Quaternary sediments present inside the WSA in the valleys adjoining the Big Horn Mountains would be the only place were oil and gas could occur. The hydrocarbon potential of the WSA is rated as low to zero by Ryder (1983).

REFERENCES

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Harrer, C. M., 1964, Reconnaissance of iron resources in Arizona: U.S. Bureau of Mines Information Circular 8236, 204 p.

Ryder, R. T., 1983, Petroleum potential of wilderness lands in Arizona, in Miller, B. M., ed., Petroleum potential of wilderness lands in the western United States: U.S. Geological Survey Circular 902-A-P, p. C1-C22.

Wilson, E. D., Moore, R. T., and Pierce, W. H., 1957, Geologic Map of Maricopa County, Arizona: Arizona Bureau of Mines, scale 1:375,000.

Table 1.--Assay results and sample descriptions for samples 1-54.

[<, less than; Tr, trace - less than detection limit but some material present; xxx, not applicable; N.A., not analyzed; Au and Ag determined by fire assay; Cu, Pb, Zn, Ti, and Fe determined by inductively coupled plasma-atomic emission spectroscopy and atomic absorption spectrophotometry]

Sample			Assay Data							
No.	Type	Length (feet)	Au	Ag	Cu	Pb	Zn	Fe	Ti	Description
			oz/ton		values in ppm unless otherwise indicated					
1	Chip	0.7	<0.005	<0.1	<5	<70	260	N.A.	N.A.	Trench, 27 ft by 6 ft; quartz vein striking N. 73° W. and dipping 72° NE. in metagranite; chlorite and hematite stain.
2	Do.	1.4	.14	.5	79	150	130	N.A.	N.A.	Pit, 8 ft by 7 ft; quartz vein striking N. 74° W. and dipping 82° NE. in metagranite; chlorite and hematite stain.
3	Do.	1.4	<.005	<.1	<5	140	280	N.A.	N.A.	Trench, 20 ft by 4 ft; quartz vein striking N. 73° W. and dipping 90° in metagranite; hematite stain.
4	Do.	3.2	<.005	<.1	<5	<70	<2	N.A.	N.A.	Trench, 13 ft by 4 ft; quartz vein striking N. 73° W. and dipping 90° in metagranite; hematite stain.
5	Do.	5.0	.01	<.1	<5	<70	<2	N.A.	N.A.	Pit, 5 ft by 4.5 ft; quartz pod in metagranite, hematite stain.
6	Do.	3.0	<.005	<.1	<5	<70	<2	N.A.	N.A.	Pit, 10 ft by 6 ft; quartz vein striking N. 75° E. and dipping 45° SE. in metagranite; hematite stain.
7	Do.	1.4	<.005	<.1	<5	<70	<2	N.A.	N.A.	Pit, 10 ft by 8 ft; quartz pod in metagranite; hematite stain.
8	Do.	1.3	Tr	.5	180	<70	27	N.A.	N.A.	Pit, 8.5 ft by 6 ft; quartz vein striking N. 66° E. and dipping 79° SE. in amphibolite; chlorite.

Table 1.--Assay results and sample descriptions for samples 1-54--Continued

Sample No.	Sample Type	Sample Length (feet)	Assay Data Au (oz/ton)	Ag	Cu	Pb	Zn	Fe	Ti (values in ppm unless otherwise indicated)	Description
9	Chip	1.1	<0.005	0.1	130	<70	<2	N.A.	N.A.	Pit, 6 ft by 3 ft; vertical quartz vein striking N. 87° W. in amphibolite; hematite stain.
10	Do.	1.1	<.005	.1	<5	<70	<2	N.A.	N.A.	Pit, 8 ft by 8 ft; quartz vein striking N. 68° W. and dipping 71° S. in metagranite; pyrolusite and hematite stain.
11	Do.	3.0	<.005	<.1	<5	<70	<2	N.A.	N.A.	Pit, 13 ft by 8 ft; quartz vein striking east and dipping 83° N. in metagranite; hematite stain.
12	Do.	2.5	<.005	<.1	87	<70	<2	N.A.	N.A.	Trench, 22 ft by 7 ft; quartz vein striking N. 66° W. and dipping 90° in metagranite; hematite stain.
13	Do.	3.6	Tr	<.1	<5	<80	<3	N.A.	N.A.	Trench, 11 ft by 5 ft; quartz vein striking N. 70° E. and dipping 76° N. in metagranite; specular hematite and hematite stain.
14	Do.	1.8	.01	.1	<5	<70	<2	N.A.	N.A.	Shaft, 35 ft deep; quartz vein striking N. 82° W. and dipping 85° N. in metagranite; hematite stain.
15	Do.	.5	<.005	.1	0.12%	<70	790	N.A	N.A.	Same shaft as sample 14; gouge zone next to quartz vein in sample 14; sheared metagranite and clay gouge.
16	Select Grab	xxx	.04	.1	.12%	<70	280	N.A.	N.A.	Dump; pieces of quartz vein; chrysocolla and hematite-limonite stain.

Table 1.--Assay results and sample descriptions for samples 1-54--Continued

Sample No.	Sample Type	Sample Length (feet)	Assay Data Au	Ag	Cu	Pb	Zn	Fe	Ti	Description
			oz/ton	values in ppm unless otherwise indicated						
17	Chip	0.6	<0.005	<0.1	<5	<70	<2	N.A.	N.A.	Trench, 10 ft by 4 ft; quartz vein striking N. 59° W. and dipping 43° NE. in metagranite.
18	Do.	2.2	.32	.1	<5	<70	<2	N.A.	N.A.	Pit, 9 ft by 9 ft; fault striking N. 80° E. and dipping 67° N. in metagranite, 1/4 to 3-1/2 in. quartz veinlets; sheared wall rock; hematite stain.
19	Do.	3.9	<.005	<.1	<5	<70	<2	N.A.	N.A.	Trench, 15 ft by 5 ft; quartz vein striking N. 31° W. and dipping 30° SW. in metagranite; minor hematite stain.
20	Do.	1.4	.02	1.6	0.28%	<70	160	N.A.	N.A.	Outcrop; fault striking N. 37° E. and dipping 52° S. in metagranite; quartz stringer with pyrite, chrysocolla, malachite, and hematite stain; sheared wall rock.
21	Do.	2.2	Tr	.1	.17%	<70	120	N.A.	N.A.	Outcrop; fault striking N. 37° E. and dipping 52° S. in metagranite; quartz stringer with chrysocolla, malachite, and hematite stain; sheared wall rock.
22	Channel	4	<.005	<.1	N.A.	N.A.	N.A.	N.A.	N.A.	Backhoe trench, 150 ft by 3.5 ft; in alluvium.
23	Channel	5	<.005	<.1	N.A.	N.A.	N.A.	N.A.	N.A.	Same trench as sample 22; in alluvium.

Table 1.--Assay results and sample descriptions for samples 1-54--Continued

Sample No.	Sample Type	Sample Length (feet)	Assay Data Au	Ag	Cu	Pb	Zn	Fe	Ti	Description
			oz/ton	values in ppm unless otherwise indicated						
24	Chip	1.8	Tr	0.2	0.66%	<70	140	N.A.	N.A.	Pit, 11 ft by 7 ft; quartz vein striking N. 42° W.; and sheared reddish brown dike in gneiss; chrysocolla and hematite stain.
25	Do.	5	Tr	.2	1.0%	<70	46	N.A.	N.A.	Outcrop next to pit; quartz vein striking N. 42° W. and sheared reddish brown dike in gneiss; quartz, chrysocolla, and hematite stain.
26	Select Grab	xxx	<0.005	.2	4.6%	0.32%	0.25%	N.A.	N.A.	Dump of 10 ft by 7 ft pit; pieces of quartz vein and sheared reddish brown dike; chrysocolla and hematite stain.
27	Chip	.5	<.005	<.1	.58%	<80	<3	N.A.	N.A.	Bulldozer cut, 40 ft by 60 ft; shear fracture striking N. 51° E. and dipping 15° NW. in granite; quartz, chrysocolla, malachite, and hematite.
28	Do.	2	Tr	.1	.12%	<80	<3	N.A.	N.A.	Bulldozer cut, 40 ft by 40 ft; pegmatitic pod in granite; quartz and chrysocolla.
29	Select Grab	xxx	Tr	.2	3.3%	<70	<2	N.A.	N.A.	Dump of 100 ft by 50 ft bulldozer cut; pieces of granite; chrysocolla and hematite stain.
30	Chip	2.5	<.005	.1	320	<70	<2	N.A.	N.A.	Same bulldozer cut as sample 29; shear fractures striking N. 8° E. and dipping 67° W.; hematite stain.

Table 1.--Assay results and sample descriptions for samples 1-54--Continued

Sample No.	Type	Length (feet)	Assay Data Au	Ag	Cu	Pb	Zn	Fe	Ti	Description
			oz/ton	values in ppm unless otherwise indicated						
31	Chip	4.5	<0.005	0.3	2.6%	<70	<2	N.A.	N.A.	Shaft, 20 ft deep; several 1/2 in. wide shear fractures striking N. 5° E. and dipping 75° W. in granite; spotty chrysocolla and hematite stain.
32	Select Grab	xxx	.01	<.1	1.3%	<70	<2	N.A.	N.A.	Dump of 50 ft by 50 ft bulldozer cut; pieces of granite and quartz; chrysocolla and hematite.
33	Chip	.5	.01	.7	1.1%	<80	<2	N.A.	N.A.	Pit, 11 ft by 8 ft; shear fractures striking N. 88° E. and dipping 68° NW. in granite; chrysocolla, malachite, and minor hematite stain.
34	Do.	2.1	Tr	.1	.31%	<80	<3	N.A.	N.A.	Bulldozer cut, 50 ft by 10 ft; shear fracture striking N. 20° W. in coarse-grained granite; quartz, chrysocolla, and minor hematite stain.
35	Do.	2.1	Tr	<.1	<5	<80	<3	N.A.	N.A.	Same bulldozer cut as sample 34; shear fracture in coarse-grained granite, striking N. 20° W.; minor hematite stain.
36	Select Grab	xxx	<.005	<.1	4.3%	80	<3	N.A.	N.A.	Dump of 20 ft by 20 ft bulldozer cut; pieces of granite and quartz; chrysocolla and minor hematite stain.
37	Do.	xxx	<.005	.4	N.A.	N.A.	N.A.	7.9%	0.18%	Sample consisted of two level 12 in. gold pans of sand, consisting of quartz, feldspar, and magnetite grains.
38	Do.	xxx	<.005	<.1	N.A.	N.A.	N.A.	10.1%	.12%	Do.

Table 1.--Assay results and sample descriptions for samples 1-54--Continued

Sample No.	Sample Type	Sample Length (feet)	Assay Data Au	Ag	Cu	Pb	Zn	Fe	Ti	Description
			oz/ton	values in ppm unless otherwise indicated						
39	Select Grab	xxx	<0.005	<0.1	N.A.	N.A.	N.A.	3.9%	0.14%	Samples consisted of two level 12 in. gold pans of sand, consisting of quartz, feldspar, and magnetite grains.
40	Do.	xxx	<.005	<.1	N.A.	N.A.	N.A.	6.5	.19	Do.
41	Do.	xxx	<.005	.1	N.A.	N.A.	N.A.	6.1	.25	Do.
42	Do.	xxx	<.005	<.1	N.A.	N.A.	N.A.	5.5	.12	Do.
43	Chip	5	<.005	<.1	130	<70	<2	N.A.	N.A.	Trench, 8 ft by 3 ft; pegmatitic pod in coarse-grained granite.
44	Select Grab	xxx	Tr	.1	1.2%	<80	<2	N.A.	N.A.	Dump of same trench as sample 43; pieces of pegmatite; chrysocolla, minor hematite stain.
45	Do.	xxx	<.005	Tr	4.8%	390	20	N.A.	N.A.	Dump of 17-ft-deep shaft; pieces of coarse-grained porphyritic granite and quartz; chrysocolla, hematite-limonite.
46	Chip	1	<.005	<.1	220	31	45	N.A.	N.A.	Same shaft as sample 45; fault striking N. 7° E. in coarse-grained porphyritic granite; gouge zone.
47	Do.	5.5	Tr	Tr	290	<30	16	N.A.	N.A.	Same shaft and fault as sample 45; quartz, chrysocolla - fractured blocky area between gouge zones.

Table 1.--Assay results and sample descriptions for samples 1-54--Continued

Sample No.	Sample Type	Sample Length (feet)	Assay Data Au	Ag	Cu	Pb	Zn	Fe	Ti	Description
			oz/ton	values in ppm unless otherwise indicated						
48	Chip	1.3	Tr	Tr	360	<30	42	N.A.	N.A.	Same shaft and fault as sample 45; gouge zone.
49	Do.	1.3	<0.005	<0.1	51	<30	38	N.A.	N.A.	Pit, 6 ft by 4 ft; shear fracture, general N 20° E strike and pegmatitic pod in coarse-grained porphyritic granite; chrysocolla, hematite-limonite.
50	Do.	4.5	<.005	<.1	0.4%	<30	39	N.A.	N.A.	Trench, 15 ft by 4 ft; shear fractures striking north in coarse-grained porphyritic granite.
51	Do.	5	<.005	<.1	1.3%	<70	<2	N.A.	N.A.	Pit, 8 ft by 8 ft; pegmatitic pod in coarse grained granite.
52	Select Grab	xxx	<.005	<.1	1.3%	<70	<2	N.A.	N.A.	Dump of 7 ft by 5 ft pit; pieces of pegmatite; chrysocolla and hematite stain.
53	Channel	2	<.005	.1	N.A.	N.A.	N.A.	N.A.	N.A.	Shaft, 8 ft deep, partially caved; in alluvium.
54	Chip	4	<.005	<.1	N.A.	N.A.	N.A.	N.A.	N.A.	Pit, 4 ft by 4 ft; brownish gray tuff; white chalcedony-filled cavities; agate prospect.

APPENDIX A--Fire assay, atomic absorption spectrophotometry, inductively coupled plasma-atomic emission spectroscopy, and semiquantitative optical emission spectrographic analysis detection limits, U.S. Bureau of Mines, Reno Research Center.

Fire Assay

Element	Ounces Per Ton
Au	0.005
Ag	0.1

Atomic Absorption spectrophotometry and inductively coupled plasma-atomic Emission spectroscopy

Element	Parts Per Million
Cu	5
Pb	30
Zn	5
Fe	10
Ti	10

Semiquantitative optical emission spectrographic analysis detection limits, U.S. Bureau of Mines, Reno Research Center.

Element	Detection limit (percent)	Element	Detection limit (percent)
Ag	0.002	Mo	0.0001
Al	.001	Na	.3
As	.01	Nb	.007
Au	.002	Ni	.0005
B	.003	P	.7
Ba	.002	Pb	.001
Be	.0001	Pt	.0001
Bi	.01	Re	.0006
Ca	.05	Sb	.06
Cd	.0005	Sc	.0004
Co	.001	Si	.0006
Cr	.0003	Sn	.001
Cu	.0006	Sr	.0001
Fe	.0006	Ta	.02
Ga	.0002	Te	.04
K	2.0	Ti	.03
La	.01	V	.005
Li	.002	Zn	.0001
Mg	.0001	Zr	.003
Mn	.001	Y	.0009

These detection limits represent an ideal situation. In actual analyses, the detection limits vary with the composition of the material analyzed. These numbers are to be used only as a guide.

APPENDIX B--Results of semiquantitative optical emission spectrographic analysis U.S. Bureau of Mines, Reno Research Center.

	SAMPLE NUMBERS							
	3	6	9	11	14	15	16	18
ELEMENTS	CONCENTRATION, PERCENT							
AG	<.0009	<.002	<.001	<.0005	<.001	<.0005	<.0007	<.0005
AL	>4.	.7	>3.	>2.	.2	>5.	1.	>4.
AS	<.07	<.009	<.01	<.04	.04	<.01	<.01	<.009
AU	<.002	<.002	<.002	<.004	<.004	<.002	<.002	<.002
B	.01	.02	.01	.04	.02	.01	.01	.1
BA	.2	.01	.005	.02	<.002	.6	.02	.1
BE	.0008	.0005	<.0003	.0003	.0004	.0009	.0005	.002
BI	<.02	<.03	<.02	<.03	<.02	<.02	<.02	<.03
CA	<.08	<.05	1.	<.05	<.05	<.05	1.	9.
CD	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.002
CO	<.004	<.005	<.002	<.001	<.005	<.001	<.002	<.04
CR	<.0004	.002	<.0004	.004	.006	<.0003	<.0009	<.0003
CU	.002	.0006	.01	.002	.01	.1	.2	.1
FE	3.	1.	.7	1.	1.	5.	3.	6.
GA	<.001	<.0009	<.0002	<.0002	<.0002	<.0002	<.0005	<.0002
K	3.	<.6	<.9	<1.	<.6	>10.	<.6	<2.
LA	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
LI	<.004	<.002	<.002	<.002	<.002	<.002	<.002	>.2
MG	.3	.01	.8	.07	.007	1.	.3	1.
MN	.06	.07	.6	.04	.02	.7	.1	.8
MO	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
NA	<1.	<.3	<.3	<.3	<.3	<.3	<.3	<.3
NB	<.01	<.007	<.007	<.007	<.007	<.007	<.007	<.007
NI	<.0005	<.0007	.002	<.0007	.0009	<.0004	<.0006	<.0004
P	<.7	<.7	<.7	<.7	<.7	<.7	<.7	<.7
PB	.02	<.003	<.002	<.004	<.006	.01	<.003	.02
PD	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
PT	<.0006	<.0006	<.0006	<.0006	<.0007	<.0006	<.0006	<.0006
SB	<.06	<.06	<.07	<.06	<.06	<.06	<.06	<.07
SC	<.0004	<.0004	<.0004	<.0004	<.0004	<.0004	<.0004	<.0004
SI	>10.	>10.	>10.	>10.	>10.	>10.	>10.	>10.
SN	<.005	<.004	<.02	<.004	<.004	<.003	<.004	<.02
SR	.0003	<.0001	.0005	<.0001	<.0001	.0003	<.0001	.002
TA	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02
TE	<.07	<.06	<.04	<.04	<.04	<.04	<.04	<.04
TI	.1	<.04	.4	<.03	<.03	.1	<.03	.1
V	<.01	.01	.02	<.005	<.005	<.005	<.01	<.005
Y	<.0009	<.0009	<.0009	<.0009	<.0009	<.0009	<.0009	.004
ZN	.1	.001	.004	<.0006	.001	.3	.07	.007
ZR	.01	.007	<.003	<.003	<.003	<.003	.004	.004

SAMPLE NUMBERS

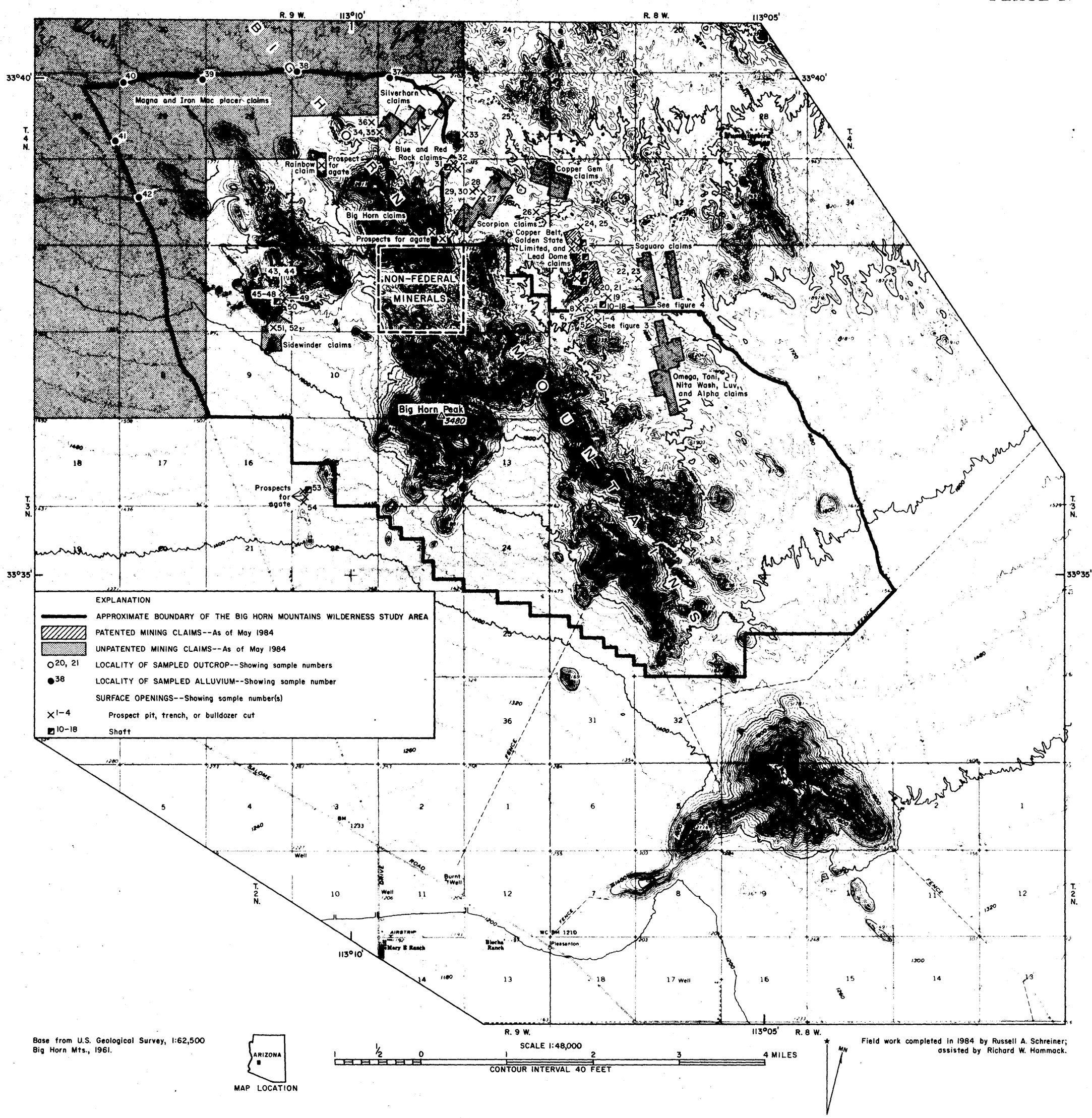
ELEMENTS	19	20	22	23	24	26	28	29
	CONCENTRATION, PERCENT							
AG	<.0006	<.01	<.0005	<.0005	<.0009	<.0005	<.0005	<.0009
AL	>4.	>5.	>5.	>5.	>5.	>5.	>5.	>5.
AS	<.02	<.02	<.02	<.02	<.01	<.02	<.02	.06
AU	<.003	<.002	<.002	<.002	<.002	<.002	<.002	<.002
B	.02	.01	.02	.02	.03	.02	.02	.02
BA	.06	.09	.3	.4	.2	.3	.01	.08
BE	.0006	<.0002	.0006	.0008	.0009	.0006	.002	.001
BI	<.03	<.02	<.02	<.01	<.01	<.02	<.01	<.02
CA	<.05	<.06	2.	4.	3.	2.	.2	.4
CD	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005	<.0005
CO	<.008	<.001	<.001	<.001	<.002	<.001	<.002	<.001
CR	.001	<.0003	<.0003	<.0003	<.0003	<.0003	<.0004	<.0003
CU	.003	7.	<.0006	<.0006	.4	2.	.1	6.
FE	1.	4.	2.	2.	7.	5.	.5	3.
GA	<.0006	<.0002	<.0002	<.0002	<.0007	<.0002	<.0003	<.0003
K	<.6	>10.	>10.	>10.	>10.	>10.	<1.	10.
LA	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
LI	<.002	<.002	.01	.01	.02	.006	.02	<.002
MG	.2	.4	1.	1.	2.	2.	.09	.9
MN	.1	.8	.3	.3	.6	.5	.02	.06
MO	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
NA	<1.	<.3	4.	4.	<.3	<1.	4.	5.
NB	<.007	<.007	<.007	<.007	<.01	<.009	<.007	<.01
NI	.0008	.0008	<.0006	.0008	.002	.001	<.0006	.0008
P	<.7	<.7	<.7	<.7	<.7	<.7	<.7	<.7
PB	<.005	<.004	<.002	<.002	<.002	<.002	<.002	<.004
PD	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
PT	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006
SB	<.06	<.06	<.06	<.06	<.09	<.06	<.06	<.06
SC	<.0004	<.0004	<.0004	<.0004	<.0004	<.0004	<.0004	<.0004
SI	>10.	>10.	>10.	>10.	>10.	>10.	>10.	>10.
SN	<.005	<.007	<.002	<.004	<.02	<.007	<.003	<.004
SR	.0004	<.0001	.003	.003	.002	.003	.001	.002
TA	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02
TE	<.05	<.04	<.04	<.05	<.04	<.04	<.06	<.04
TI	<.03	.09	.1	.1	.6	.2	<.03	.1
V	<.005	<.005	<.005	<.005	.02	<.005	<.005	<.006
Y	<.0009	<.0009	<.0009	<.0009	<.0009	<.0009	<.0009	<.0009
ZN	.001	.03	.007	.008	.04	.01	.001	.01
ZR	.006	<.003	<.003	<.003	<.003	<.003	<.003	<.003

	SAMPLE NUMBERS							
	32	37	38	39	40	41	42	44
ELEMENTS	CONCENTRATION, PERCENT							
AG	<.0005	<.0005	<.0005	<.0006	<.0005	<.0005	<.0005	<.0008
AL	>5.	>5.	>5.	>5.	>5.	>5.	>6.	>6.
AS	<.02	<.02	<.01	<.02	<.01	<.02	<.02	<.02
AU	<.002	<.002	<.002	<.002	<.002	<.002	<.002	<.002
B	.01	.01	.06	.01	.01	.02	.02	.02
BA	.2	.2	.2	.3	.3	.3	.3	.2
BE	.0006	.0007	.002	.0005	.0006	.0006	.0008	.001
BI	<.01	<.02	<.03	<.03	<.01	<.02	<.03	<.02
CA	2.	1.	2.	3.	2.	2.	2.	.2
CD	<.0005	<.0005	<.0009	<.0005	<.0005	<.0005	<.0005	<.0005
CO	<.001	<.001	<.03	<.001	<.001	<.002	<.004	<.002
CR	<.0003	<.0004	<.0009	<.0007	<.0004	<.0008	<.0006	<.0003
CU	2.	.004	.05	.0008	.001	.02	.08	B.
FE	5.	7.	9.	5.	7.	6.	7.	2.
GA	<.0003	<.0004	<.0002	<.0004	<.0002	<.0007	<.0002	<.0008
K	>10.	>10.	>10.	>10.	>10.	>10.	>10.	>10.
LA	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
LI	<.002	<.002	.02	<.002	<.002	<.004	<.002	<.002
MG	1.	.8	.7	1.	1.	1.	.9	.9
MN	.1	.2	.2	.1	.2	.3	.2	.08
MO	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
NA	3.	3.	2.	3.	1.	3.	2.	6.
NB	<.009	<.009	<.007	<.009	<.007	<.01	<.007	<.02
NI	.001	.001	.002	.001	.001	.002	.002	.0008
P	<.7	<.7	<.7	<.7	<.7	<.7	<.7	<.7
PB	<.002	<.002	.02	<.002	<.002	<.004	<.006	.01
PD	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
PT	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006	<.0006
SB	<.06	<.08	<.06	<.06	<.06	<.06	<.06	<.06
SC	<.0004	<.0004	<.0004	<.0004	<.0004	<.0004	<.0004	<.0004
SI	>10.	>10.	>10.	>10.	>10.	>10.	>10.	>10.
SN	<.009	<.01	<.03	<.009	<.01	<.01	<.02	<.004
SR	.01	.009	.01	.01	.02	.02	.01	.001
TA	<.02	<.02	<.02	<.02	<.02	<.02	<.02	<.02
TE	<.07	<.04	<.04	<.04	<.04	<.05	<.05	<.04
TI	.1	.1	.1	.1	.2	.2	.1	.2
V	<.008	.02	.04	.02	<.01	.02	.02	<.006
Y	<.0009	<.0009	<.0009	<.0009	<.0009	<.0009	<.0009	<.0009
ZN	.006	.008	.005	.004	.005	.01	.005	.01
ZR	.005	.004	.006	<.003	<.003	<.003	<.003	<.003

	SAMPLE NUMBERS				
	45	47	49	53	54
ELEMENTS	CONCENTRATION, PERCENT				
AG	<.0006	<.0005	<.0005	<.0005	<.0005
AL	>5.	>5.	>5.	>5.	>5.
AS	<.009	<.02	<.009	<.02	<.02
AU	<.002	<.002	<.002	<.002	<.002
B	<.003	.02	.01	.01	.02
BA	.01	.2	.04	.3	.4
BE	.0006	.0006	.002	.0005	.0005
BI	<.04	<.03	<.01	<.02	<.02
CA	.2	2.	2.	5.	2.
CD	<.0005	<.0005	<.0005	<.0005	<.0005
CO	<.001	<.001	<.001	<.001	<.001
CR	.001	<.0003	<.0003	<.0003	<.0003
CU	.5	.3	8.	<.0006	.003
FE	3.	4.	3.	3.	3.
GA	<.0002	<.0002	<.0004	<.0003	<.0002
K	<2.	>10.	9.	>10.	>10.
LA	<.01	<.01	<.01	<.01	<.01
LI	<.002	.03	<.003	<.002	<.002
MG	.3	1.	1.	1.	1.
MN	.1	.2	.09	.2	.2
MO	<.0001	<.0001	<.0001	<.0001	<.0001
NA	<1.	3.	5.	2.	3.
NB	<.01	<.009	<.01	<.007	<.007
NI	<.0005	.001	<.0007	.001	.0009
P	<.7	<.7	<.7	<.7	<.7
PB	.03	<.003	<.002	<.002	<.002
PD	<.0001	<.0001	<.0001	<.0001	<.0001
PT	<.0006	<.0006	<.0006	<.0006	<.0006
SB	<.06	<.06	<.06	<.06	<.06
SC	<.0004	<.0004	<.0004	<.0004	<.0004
SI	>10.	>10.	>10.	>10.	>10.
SN	<.001	<.005	<.004	<.005	<.003
SR	.0002	.01	.007	.006	.03
TA	<.02	<.02	<.02	<.02	<.02
TE	<.04	<.04	<.05	<.04	<.04
TI	<.03	.1	.1	.2	.1
V	<.009	<.005	<.005	<.005	<.005
Y	<.0009	<.0009	<.0009	<.0009	<.0009
ZN	.004	.006	.02	.003	.009
ZR	<.003	<.003	.008	<.003	<.003

DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

OPEN FILE REPORT
MLA 44-85
PLATE 1



MINE AND PROSPECT MAP OF THE BIG HORN MOUNTAINS WILDERNESS STUDY AREA, MARICOPA COUNTY, ARIZONA

BY

RUSSELL A. SCHREINER, U.S. BUREAU OF MINES

1985